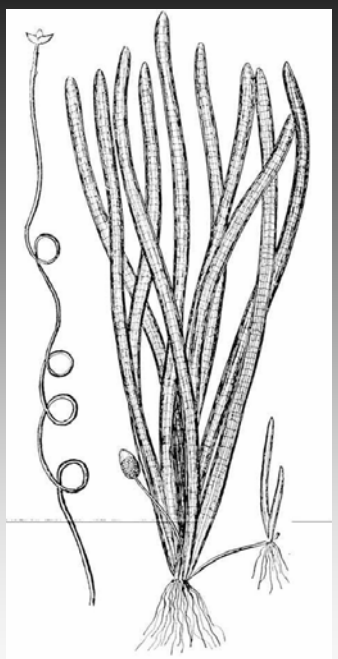


**Grade Levels:**
6-8

**Subject Areas:**
Biology, Botany, Environmental Science, Marine Biology

**Duration:**
6-8 weeks, 1-2 hours initially, 5-10 minutes per day thereafter

**Skills:**
Problem solving, organizing, interpreting, communicating information

# Effect of Flow Rate on Wild Celery Growth

(Between Tank Experiment)

## Summary

Will changing the flow of water in the growth chambers affect the wild celery plants' growth? Students set up two chambers with different flow rates and measure the plants to compare their growth over the duration of the project.

## Maryland State Assessment Outcomes

Nature of Science: Students will demonstrate the ability to interpret and explain information generated by their exploration of scientific phenomena.

Processes of Science: Students will demonstrate the ability to employ the language, instruments, methods, and materials of science for collecting, organizing, interpreting, and communicating information.

Math – Statistics: Collect, organize, and display data.

## Maryland State Assessment Indicators

Nature of Science: Generate a consensus based on data.

Processes of Science: Demonstrate the following: controlling variables, conducting an experiment, and drawing conclusions. Communicate experimental procedures and findings orally and in writing.

Math – Statistics: Collect, organize, display, and interpret data for a given situation using appropriate displays. Use data analysis to write an evaluative argument in a real life situation.

## Materials

Per class/group of several classes:
One "Bay Grasses in Classes" standard growth kit

## Making Connections

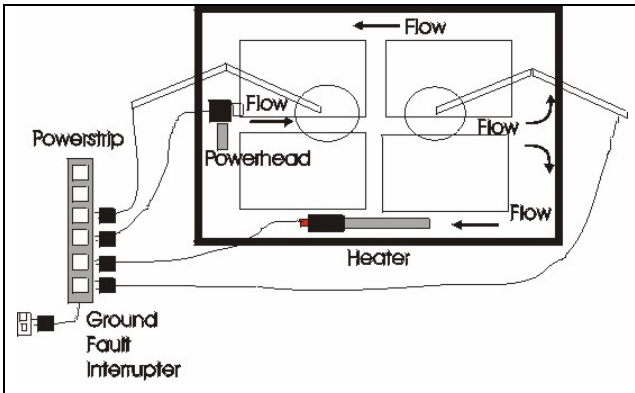
You are growing bay grass to plant in the Chesapeake Bay to restore habitat for many bay creatures. Water in the Chesapeake Bay is almost always moving. You will simulate the growing conditions of the Chesapeake Bay in growth chambers. Does a constant flow of water affect the growth of wild celery?

## Background

Refer to the *Vallisneria americana* Fact Sheet Lesson for background information about wild celery. Visit the Bay Grasses in Classes website at http://www.dnr.maryland.gov/bay/sav/bgic/ for additional background information.

## Procedure

Set up the Bay Grasses in Classes Growth Chambers as instructed in the protocol, labeling one Chamber "A" and placing one powerhead in it. Label the other Chamber "B" but place no powerhead in it. See diagram below.




Chamber A = Flow
(1 powerhead)

Chamber B = No Flow
(no powerhead)

Record the growth of the wild celery weekly on the Data Log (Page 20 in protocol). Follow the protocol directions for all other procedures (water addition, and water quality tests).

**The students should fill out the "**Experiment Diagram and Growth Chamber Set-up**" form and the "**Initial Water Quality Data**" form (pages 19 and 21 in protocol) and fax it to DNR at the time that you set up the chambers.

** To submit data each week, teachers should go to the on-line data entry page at http://mddnr.chesapeakebay.net/bgic/loginindex.cfm. If there are any problems with entering your data on-line, please fax your data sheet to Maryland DNR at 410-260-8859.

## Assessment/Evaluation

Students should complete the Pre-lab and Post-lab Activities included in this binder. Students will compare the growth rates of the wild celery plants in the two chambers by creating a line graph of their data. Students will also draw a conclusion of their experiment.

# 2006 Wild Celery Data Log for Flow Rate Experiments

**School:_____ Teacher:_____**

**Grade/Class:_____ Week# 1 2 3 4 5 6 7 8 9 10 11 12 13 14**

*(Week 1 = when germination is first noticed)*

**Experiment Type: Flow Rate**

**Chamber Type: (circle one)** flow (1 powerhead) no flow (0 powerhead)

***(black ink only please)***

| *Daily Monitoring* | | | | | |
|---|---|---|---|---|---|
| **Date (month/day)** | **Water Temp. (°C)** | **(°F)** | **Water Depth (fill to 6 ½")** | **Light Height (should be 10")** | **Comments (Date plants first visible, heavy algal growth)** |
| **Monday** _____ | | | | | |
| **Tuesday** _____ | | | | | |
| **Wednesday** _____ | | | | | |
| **Thursday** _____ | | | | | |
| **Friday** _____ | | | | | |
| **Average Temp:** | | | | | |

| *Weekly Monitoring* | | |
|---|---|---|
| **Date** | **pH** | **Nitrate (ppm)** |
| | | |

| **Tallest Plant in Tray 1 (cm)** | **Tallest Plant in Tray 2 (cm)** | **Tallest Plant in Tray 3 (cm)** | **Tallest Plant in Tray 4 (cm)** | **Average Plant Height (cm)** |
|---|---|---|---|---|
| | | | | |

***NOTE: Please use the on-line data entry system to enter your data. If you can not access the internet, fax this page to Maryland DNR c/o Mark Lewandowski 410-260-8859 at end of each week.***